Space Station Quality Assurance Requirements

International Space Station Alpha Program

Revision A

October 26, 1994

National Aeronautics and Space Administration

Space Station Program Office
Houston, Texas
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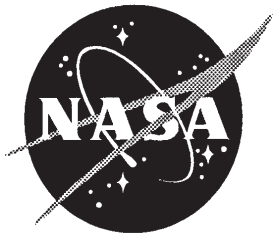

REVISION AND HISTORY PAGE

REV.	DESCRIPTION	PUB. DATE
–	SRR Baseline Issue (Reference SSCD: 000002)	2/7/94
A	Revision A reflecting NASA/Prime technical convergence agreements – Ref. 8–31–94 MOU (Reference SSCD 000082 Eff. 11–04–94)	11–07–94

PREFACE

International Space Station (ISS) Quality Assurance (QA) and Software Quality Assurance (SQA) requirements are defined and controlled in this document. In the implementation of QA and SQA requirements, consideration shall be given to criticality, complexity, state of hardware or software development and unit and life cycle costs. The methods for implementing these requirements shall be described in the QA and SQA plans.This document is under the control of the Space Station Control Board and any changes or revisions to this document shall be approved by the Program Manager.

per SSCBD 000082	11/04/94
Program Manager, International Space Station Alpha	Date

INTERNATIONAL SPACE STATION ALPHA PROGRAM

SPACE STAION QUALITY ASSURANCE

OCTOBER 26, 1994

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INTERNATIONAL SPACE STATION PROGRAM

SPACE STATION QUALITY ASSURANCE REQUIREMENTS

LIST OF CHANGES

OCTOBER 26, 1994

All changes to paragraphs, tables, and figures in this document are shown below:

SSCBD	ENTRY DATE	CHANGE	PARAGRAPH(S)
			TABLE(S)
			FIGURE(S)
			APPENDIX(ES)
			ADDENDA

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APPENDIX

1.0 INTRODUCTION

1.1 PURPOSE

This document establishes programmatic Quality Assurance (Section 3.0) and Software Quality Assurance (Section 4.0) requirements for the design, development, production, assembly, integration, test, and operation of the International Space Station.

1.2 SCOPE

These QA and SQA requirements are applicable to the National Aeronautics and Space Administration(NASA), the Prime Contractor, and the Tier 1 subcontractors.

1.3 MANAGEMENT APPROACH

Management of QA and SQA shall include the following:

1.3.1 Defining the major QA and SQA tasks. Assuring that these tasks are integrated and performed into the applicable program phases(s).

1.3.2 Evaluating the quality of the hardware, software, and operations through analysis, tests, reviews, and assessments.

1.3.3 Providing status through program reviews and as a part of program status reports.

1.3.4 Ensuring compatible QA and SQA requirements among manufacturing, assembly, integration, test, launch, and ground operations sites.

1.3.5 QA and SQA plans shall be prepared. These plans shall define the tasks and products of the QA and SQA activities and the organizational responsibilities for implementing these tasks. The plans will provide visibility of QA and SQA activities to be accomplished during the life of the ISS program.

1.4 PROGRAM REQUIREMENTS

The QA and SQA requirements set forth in this document shall take precedence in cases of conflict with requirements contained in subtier documents.

1.5 INDEPENDENT EVALUATIONS

The buyer reserves the right to appoint independent representatives to assist in QA and SQA evaluation activities. These representatives will provide technical support to the buyer and determine the effectiveness of and recommend improvements for the QA and SQA activities.

1.6 DATA REQUIREMENT DESCRIPTIONS

Data Requirements (DRs) which define the applicable QA and SQA documentation requirements for the buyer are contained in the Statement of Work. This represents the basic set of DRs for use in all NASA ISS procurements. The prime contractor and the tier 1 subcontractors have the flexibility to add, combine, separate, expand, or delete the NASA DRs as appropriate in their QA/SQA requirement flowdowns, but the basic DR requirements are mandatory at the Prime and Tier 1 levels. However, the prime contractor cannot delete QA/SQA DRs in their flowdowns to the Tier 1 subcontractors.

1.7 MILESTONE REVIEWS

QA and SQA activities shall include supporting internal and supplier design reviews, buyer and NASA and International Partner (as applicable) design and readiness reviews. Participation in milestone reviews shall assure that QA and SQA requirements are adequately considered.

2.0 APPLICABLE DOCUMENTS

The following documents of the issue and date shown, include specifications, models, standards, guidelines, handbooks, and other special publications.

The documents in this paragraph are applicable to the extent specified herein. Inclusion of applicable documents herein does not in any way supersede the order of precedence as identified in the contract. The references show where each applicable document is cited in this document.

DOD–STD–2168 Rev. Base Date: April 29, 1988	Defense System Software Quality Program (Ref. 4.0)
MIL–STD–105 Rev. D Date: April 29, 1963	Sampling Procedures and Tables for Inspection by Attributes (Ref. 3.11.1)
MIL–STD–414 Rev. Base Date: June 11, 1957	Sampling Procedures and Tables for Inspection by Variable for Percent Defective (Ref. 3.11.1)
MIL–STD–45662 Rev. A Date: August 1, 1988	Calibration System Requirements (Ref. 3.8)
JSCM 2410.11 Rev. New Date: October 1993	AIS Security Manual (Ref. 4.4)
SSP 30223 Rev. F Date: October 26, 1992	Problem Reporting and Corrective Action System Requirements for the Space Station Program (Ref. 4.3)

3.0 QUALITY ASSURANCE REQUIREMENTS

These quality requirements are applicable to all Space Station(SS) hardware and software designated as flight components, subsystems, systems, and/or equipment including Flight Support Equipment (FSE) and Orbital Support Equipment (OSE). These quality requirements are also applicable to Ground Support Equipment (GSE) that: 1) either physically or functionally interfaces with flight hardware/software; 2) could by its malfunction cause loss of life or loss/damage to flight, GSE, or facilities hardware/software; and/or 3) generated data used in determining flight worthiness/certification. These quality requirements may be tailored for other GSE as appropriate to the mission and intended useful life. Test Support Equipment and Factory Equipment may be tailored to the appropriate company standards.

3.1 MANAGEMENT AND PLANNING

3.1.1 PLANNING

Quality Assurance activities shall be planned and developed to be an integral part of Space Station design, development, test and evaluation, production, operational activities and refurbishment/overhaul. Scheduled status reporting will be used to provide visibility and assist in controlling the Quality Assurance effort. Objectives will be to plan and establish the Quality Assurance effort: to define the major Quality Assurance tasks and their place as an integral part of the design and development process; and to assure the effective implementation of Quality Assurance requirements. Quality Assurance program planning shall address all program phases and shall provide a comprehensive management approach to preventing, detecting, documenting, and resolving actual or potential nonconformances.

3.1.2 ORGANIZATION

Organizations and personnel responsible for implementing and performing Quality Assurance functions shall have well defined responsibilities, authority, and organizational freedom to develop and implement Quality Assurance disciplines and controls. One designated person shall have the responsibility and authority for directing and managing the Quality Assurance activity. That person shall have unimpeded access to the management level having full responsibility for the program/project work and shall report regularly on the status and effectiveness of quality activities.

3.1.3 QUALITY PROGRAM PLAN

The quality organization shall prepare, implement, and maintain a quality plan which describes the compliance with requirements set forth herein. The plan content shall be readily identifiable with each cited requirement and shall cover all quality activities. The seller’s quality assurance

procedures which define involvement by the buyer shall be reviewed and approved by the buyer. New or existing policies and procedures with no buyer involvement shall be available for review. The plan shall serve as the master planning and control document and shall be submitted in accordance with contract data requirements.

3.1.4 MANAGEMENT ASSESSMENT DATA

The quality organization shall provide periodic quality progress and status reports to their respective program management office and the buyer.

3.1.5 TRAINING

3.1.5.1 Quality Assurance shall provide input into training courses used in the various Quality Assurance disciplines for submittal to the government for inclusion in the flight crew training program. Included shall be courses for on–orbit verification methods, techniques, and equipment unique to the hardware being developed.

3.1.5.2 Quality Assurance shall also assure development, implementation, and maintenance of a documented training program for special processes. Personnel performing or inspecting special processes shall be trained and certified. Evidence of personnel certification shall be available in the area where duties are being performed. Personnel recertification shall be required as a result of unsatisfactory performance, changes in techniques or required skills, and/or extensive interruption of work performance. Records of training, testing, and certification status of personnel shall be maintained and shall be available for review by the buyer or its delegated representative.

3.1.6 INTERNAL QUALITY PROGRAM AUDITS

3.1.6.1 Quality Assurance shall conduct audits of task performance, procedures, and operations which implement the quality program. Assessments shall be conducted periodically as appropriate with program maturity and shall be performed by personnel not having specific line responsibilities in those areas. Each audit shall include an examination of operations and documentation, evaluation of actual operations as compared with each established requirement, documentation of discrepancies and deficiencies, and recommendations for corrective action, as appropriate. A corrective action plan which addresses measures to be taken to correct the discrepancies/deficiencies noted during the audit shall be prepared and approved. Follow–up activities shall include reviews to ensure that measures required by the corrective action plan are being implemented properly.

3.1.6.2 The results of audits shall be documented in a report to management. Management action shall be taken to ensure correction of the reported deficiencies. Follow–up reviews shall be made to ensure that required corrections have been implemented. Records of the seller's audits shall be available for review by the buyer or its delegated representative.

3.1.7 MILESTONE REVIEWS

Quality Assurance activities shall include supporting project milestones such as design, acceptance, and readiness reviews. Participation in reviews shall assure that quality requirements are considered in decisions which affect hardware design, configuration controls, initiation of subsystem and integrated testing, shipment, and readiness for flight. Quality Assurance data presented will contain sufficient detail to allow management to assess the acceptability to proceed with the next program phase activity.

3.2 DESIGN AND DEVELOPMENT CONTROLS

3.2.1 TECHNICAL DOCUMENTS

Quality Assurance shall conduct timely reviews of technical documents and changes thereto prior to document release. Technical documents include, but are not limited to, specifications, engineering drawings, engineering change orders, program plans, implementing procedures, work instructions, deviations/waivers, and documentation and DRs. Designs produced by automated systems shall have an equivalent level of control.

3.2.1.1 Quality Assurance shall verify that a documentation system that assures the inclusion of quality characteristics and design criteria in specifications, procedures, drawings, fabrication and inspection planning, and test documents is established and implemented.

3.2.1.2 Quality Assurance shall assure that the drawing system and other specifications identify hardware characteristics requiring verification with particular emphasis on critical characteristics. This identification shall be used in developing quality inspection and test verification planning and procedures.

3.2.2 CHANGE CONTROL VERIFICATION

Engineering changes shall be reviewed by Quality Assurance to determine the quality impact, such as modified inspection/test requirements, identification of new or modified tooling, gaging, or test equipment needs, and identification of changes to critical inspection/test procedures.

Change incorporation shall be verified in accordance with specified effectivity with special attention to changes involving interface relationships.

3.2.3 PRODUCT/PROCESS DEVELOPMENT

Quality Assurance shall participate in product and process development activities to ensure that fabrication quality requirements are defined in concert with product requirements. Quality shall assure criteria for material, and process controls are developed consistent with these requirements. Product and process activities include, but are not limited to development of mockups, engineering models, qualification/protoflight units, development test units, and development of processes and fabrication methods. Commensurate with these activities, Quality Assurance shall develop methods and plans for verification of these requirements with particular emphasis on early identification of critical characteristics.

3.3 IDENTIFICATION AND DATA RETRIEVAL

3.3.1 GENERAL

A documented identification and data retrieval system shall be developed, implemented, and maintained. The Contractor shall use identification numbers related to the engineering design. Criticality, design complexity, application, performance characteristics, manufacturing, processing or environmental conditions, and limited–life sensitivity shall be used to determine the level of control applied through identification and data retrieval requirements. An identification and data retrieval system shall be provided for parts and materials installed or consumed in the Space Station flight elements. This system shall provide traceability to the related manufacturer's lot or batch number and/or date code for parts and materials. An identification and data retrieval system shall be provided for part and material traceability as follows:

3.3.1.1 Each article and material shall be identified by a unique part or type number, and as applicable, one or more of the following detailed identification methods:

3.3.1.1.1 Manufacturer's Contractor and Government Entity (CAGE) code and date codes indicating date of manufacture to identify articles or materials made by a continuous and controlled process and those which are subject to variation or degradation with age.

3.3.1.1.2 Manufacturer's CAGE code and lot numbers to identify individual materials or articles produced in homogeneous groups.

3.3.1.1.3 Serial numbers to identify materials or articles for which unique data are to be maintained.

3.3.1.1.3.1 Controls shall be included to assure serial numbers are assigned in a consecutive manner, gaps in serial numbers permitted.

3.3.1.1.4 Standard usage hardware (e.g. non–high strength fasteners, shims, pins) which are not safety or functionally critical and fall outside the date code, lot number, and serial number screens shall require part or type number traceability only.

3.3.1.2 Other identification methods, such as paint dots, etc., shall be approved by the buyer or a designated representative.

3.3.1.3 Methods of application and location of part or type numbers and detailed identification on articles shall be indicated in engineering drawings and/or specifications.

3.3.1.4 Records shall indicate detailed identification and be organized so that records and the related article or material may be located and retrieved as necessary.

3.3.1.5 Requirements shall be established for Electrical, Electronic, and Electromechanical (EEE) parts which will provide the capability of tracing backwards from fabricated hardware to the lot from which the part originated.

3.3.2 RETENTION OF RECORDS

Records shall be retained in a safe, accessible location for the period specified in the contract. Records shall not be destroyed unless authorized by the buyer’s contracting officer.

3.3.3 RECORD RETRIEVAL

Record systems shall ensure that records are identified and related to the applicable articles and materials. The system shall be organized so that these records and the related articles and materials may be rapidly located and retrieved.

3.4 PROCUREMENT

3.4.1 PROCUREMENT CONTROLS

The buyer is responsible for assuring that purchased articles, materials, and services conform to the requirements specified in this document and other program requirements. Control of

procurements shall include identification of contract quality requirements, selection of qualified suppliers, verification of product quality and compliance with contractual requirements, and provisions for reporting and correcting nonconformances.

3.4.2 SELECTION OF SELLERS

Quality personnel shall participate in the selection of sellers based on one of the following:

3.4.2.1 The seller shall have a previous and continuing record of supplying quality articles, materials, or services of the type being procured.

3.4.2.2 A preaward survey of the seller's facility and quality system shall be conducted in accordance with documented procedures, developed by the buyer, to determine if the seller is capable of satisfying procurement quality requirements. The results of preaward surveys shall be documented and maintained on file.

3.4.2.3 When articles or materials are/were fabricated by sellers for NASA (or associated international participants government), or applicable Department of Defense (DOD) contracts that have current acceptable surveys, a preaward survey is not required. Applicable DOD contracts are those requiring implementation of MIL–Q–9858 or MIL–I–45208 as appropriate.

3.4.2.4 Sellers of off–the–shelf and industry standard products or services which are non–critical/non–complex and for which compliance with purchase order requirements can adequately be determined upon receipt, shall not require quality pre–award review, survey or evaluation. Verification of compliance to purchase order requirements shall be accomplished during buyers receiving inspection/test.

3.4.3 PROCUREMENT DOCUMENTS

Procurement documents shall be written and processed in accordance with the following:

3.4.3.1 Prior to release, applicable procurement documents shall be approved by quality personnel to ensure inclusion of appropriate quality requirements and associated documentation.

3.4.3.2 Procurement documents shall require each seller and its subtier sources to comply with the applicable requirements of this document. The seller, in complying with these requirements, may use its existing procurement requirements documents subject to approval by the buyer prior to implementation.

3.4.3.3 Procurement documents shall contain the following specific requirements:

3.4.3.3.1 Changes. The seller including proprietary sources under source drawing control shall be required to notify the buyer of any proposed changes in fabrication, materials, methods, product operating characteristics, or processes previously approved and shall obtain written approval from the procuring authority before making the change. Proprietary sources not under source drawing control shall notify the buyer of any changes in fabrication materials, methods, product operating characteristics, or process prior to delivery.

3.4.3.3.2 Test Results. Records of test results shall be maintained and must be traceable to the procured articles. Purchased raw materials shall be accompanied with chemical and/or physical test results.

3.4.3.3.3 Government Source Inspection (GSI). When the government elects to perform inspection at a procurement source, the following statement shall be included in the procurement document: "Work on this order is subject to inspection and test by NASA or its designated representatives at any time or place. The NASA quality representative who has been designated representatives at any time or place. The NASA quality representative who has been delegated the Quality Assurance functions on this procurement shall be notified immediately upon receipt of this order. NASA or its designated representatives shall also be notified 48 hours in advance of the time articles or materials are ready for inspection or test." Imposition of GSI by the government does not direct the buyer to perform source inspection at the supplier. Non performance of source inspection at the supplier does not relieve the buyer of responsibility to meet all contract requirements.

3.4.3.3.4 Procurements Other Than Those Requiring GSI. Procurements which do not require GSI shall include the following statement: "The Government reserves the right to inspect the work included in this order at the supplier's plant."

3.4.4 PROCUREMENT DOCUMENTS REVIEW

The buyer shall submit procurement documents to the designated government quality representative for GSI determination prior to procurement release for the following purchase types: 1) purchases for products or services that are either complex or have critical application and which conformance to contract requirements cannot or should not, for economical reasons, be fully determined on receipt, or 2) purchases requiring direct shipment from the supplier to the government. However, procurement documentation for products or services for which

conformance to contractual requirements may be adequately determined by the buyer upon receipt do not require submittal to the government quality representative prior to release, but shall be available for review. Source inspection performed by and for the convenience of the government shall not replace contractor source inspection or relieve the contractor of the responsibility for ensuring product quality.

3.4.5 QUALITY ASSURANCE PERSONNEL AT SOURCE

The buyer shall assign a resident or itinerant Quality Assurance personnel at contractor, subcontractor, or supplier facilities based on the criticality and complexity of the equipment, experience with the source, when testing or critical inspections cannot be accomplished by the buyer, or when articles or materials are designated for direct shipment from the seller to a NASA Center, or the using site. The buyer shall provide written instructions for its source personnel which will include a requirement to record the history and results of source activities in the following areas: general information, system control, product control, and process control.

3.4.6 RECEIVING INSPECTION

Quality Assurance shall develop, implement, and maintain a documented receiving inspection activity to ensure that procured articles comply with procurement document requirements, inspection and test data are accurate and acceptable, evidence of contractor and/or government source inspection has been provided as required, specified identification and data retrieval requirements have been met, time/cycle sensitive articles are identified, expended and remaining time/cycle information is complete, chemical analysis and physical tests are performed, and receiving inspection results and status of articles are maintained. Procedures shall provide for laboratory analysis and testing on a sampling basis to verify the validity of test reports received from suppliers.

3.4.7 SELLER DATA

Inspection and test results commencing with receiving inspection shall be recorded to reflect, on a continuous basis, the qualitative and quantitative performance of individual sellers and the quality histories of the supplied articles and materials. Quality Assurance shall maintain data to aid in the selection of sellers, establish trends of potential problems, and initiate action to resolve any negative trends.

3.4.8 AUDITS AND SURVEYS OF SELLER OPERATIONS

3.4.8.1 The buyer shall schedule and conduct audits and surveys of sellers to ensure contract compliance based upon the following:

3.4.8.1.1 Type of items being procured: e.g., criticality or complexity of article, material, or special processes involved.

3.4.8.1.2 Seller quality history including known problems or difficulties.

3.4.8.1.3 Remaining period of seller performance.

3.4.8.1.4 Major changes occurring in the suppliers organization, equipment, location, or activities which could impact capabilities.

3.4.8.2 For planning purposes, a schedule shall be prepared and shall include all planned audits and surveys and shall be amended to accommodate unanticipated problem areas. The schedule shall be maintained throughout the duration of the procurement and shall be available for review.

3.4.8.3 The audits and surveys shall be to evaluate the quality system, including implementing policies and procedures, and shall be performed in accordance with documented procedures and checklists which are based on program requirements. Audit and survey results shall be documented and follow–up action shall be taken to ensure deficiencies have been corrected within the specified period of time.

3.4.8.4 The contractor shall participate in the planning and/or conduct of joint audits or surveys with the shuttle program to minimize the number of audits and surveys performed at common sellers.

3.5 FABRICATION CONTROLS

3.5.1 FABRICATION OPERATIONS

Quality shall support fabrication operations, including assembly and test, to verify that critical characteristics of the design are identified and their conformance to engineering specifications are maintained in all articles produced. Critical characteristics shall be selected by quality, manufacturing, and engineering personnel and shall be derived from drawings, specifications, Failure Modes and Effects Analysis/Critical Items List (FMEA/CIL), Hazard Analysis, etc. Critical characteristics shall be designated as inspection points that must be verified by Quality

Assurance personnel. Identification of these characteristics, definition of methods, and sequence of operation shall be consistent with the criteria, methods, and plans developed during product development and reviewed at design reviews. Detailed fabrication and inspection planning shall contain the following as a minimum:

3.5.1.1 Nomenclature and identification of the article to be fabricated.

3.5.1.2 Drawings and specifications required.

3.5.1.3 Tooling, jigs, fixtures, and other fabrication equipment to be utilized.

3.5.1.4 Detailed instructions for fabrication and assembly of articles.

3.5.1.5 Critical characteristics and tolerances required.

3.5.1.6 Detailed procedures for controlling processes and cleaning, preservation, and packaging operations.

3.5.1.7 Special conditions to be maintained such as environmental controls, specific cleanliness levels, and precautions to be observed.

3.5.1.8 Workmanship standards if applicable.

3.5.1.9 Specific inspections and/or test operations to be performed during fabrication to provide verification of design characteristics.

3.5.1.10 Special handling equipment and protective devices [e.g. Electrostatic Discharge (ESD) control].

3.5.1.11 Traceability to the individual performing the operation and to the inspection personnel verifying compliance.

3.5.1.12 Traceability to the FMEA/CIL where applicable.

3.5.1.13 Configuration data, including parts lists, drawings, changes, specifications, and identification data, to ensure fabrication to the proper design requirements.

3.5.1.14 If quality designees (reference paragraph 3.5.8) are used, the operations to be performed by such personnel shall be strictly identified.

3.5.1.15 When the government has specified source control inspections for subtier purchases (as identified in paragraph 3.4.4) the contractors QA organization shall ensure government Mandatory Inspection Points (MIPs) (in accordance with criteria provided to the contractor from the NASA Quality Assurance Representative (QAR)) are incorporated into the detailed planning. The sellers quality organization shall then coordinate with the government QAR for MIP coverage.

3.5.1.16 For in–house fabrication, assembly and test the contractors quality organization shall ensure government MIPs (in accordance with criteria provided to the contractor from the NASA QAR) are incorporated in the detailed planning. Quality shall then coordinate with the government QAR for MIP coverage.

3.5.2 ARTICLE AND MATERIAL CONTROLS

The following controls shall ensure that only conforming articles and materials are accepted and used:

3.5.2.1 Data shall be maintained for articles identified as having characteristics of quality degradation or drift with age and/or use. The date, time, or cycle from which useful life is calculated; the date, time, or cycle at which the useful life will be expended; and the incurred operating time or cycles shall be recorded.

3.5.2.2 Quality Assurance shall verify that requirements for articles and materials to be fabricated, processed, inspected, or tested in a temperature, humidity, ESD, or contamination controlled environment are properly implemented.

3.5.2.3 Quality Assurance shall verify, prior to initial use and if analysis requires at established intervals thereafter, the accuracy of production jigs, fixtures, tooling masters, templates, patterns, and other devices used for inspection.

3.5.3 CLEANLINESS/CONTAMINATION CONTROL

Quality Assurance shall assure that contaminant–sensitive items are cleaned and controlled in accordance with documented procedures to the levels specified in the applicable technical documents and are maintained to these cleanliness levels. These procedures shall cover hardware, equipment, personnel, and control of such areas as fabrications, assembly, inspection, test, and storage. Specific cleanliness levels to be maintained for systems, subsystems, and major components shall be indicated on drawings, specifications, or other documents controlling the manufacture and test of those items. Quality Assurance shall assure that clean–room disciplines and procedures are properly implemented and monitored to assure continuing compliance with requirements.

3.5.4 PROCESS CONTROLS

3.5.4.1 Quality Assurance shall implement controls for those processes where uniform, high quality cannot be assured by inspection of articles alone. These processes include, but are not limited to, metallurgical and chemical processes, soldering, welding, potting, bonding processes, plating and coating processes, and surface treating processes. These controls shall assure that special processes are performed by certified personnel; that facilities, equipment, materials, and procedures are adequate, maintained, and properly used; and that records are controlled.

3.5.4.2 An up–to–date listing shall be maintained of all process control procedures and process specifications used in the fabrication, control, and inspection of the materials and articles. Seller process specifications shall be available for review by the buyer or its delegated representative. The seller shall also furnish similar information from the subcontractors upon request. Requirements for disclosure of contractor and subcontractor proprietary process specifications shall be established with NASA on an individual basis.

3.5.5 NONDESTRUCTIVE EVALUATION

Nondestructive Evaluation (NDE) methods shall be used, as required by engineering specifications, and controlled to ensure quality hardware. NDE standards shall be used or prepared based on hardware configurations and geometry. Quantitative acceptance or rejection criteria shall be established for each NDE application. Personnel performing NDE processes shall be trained and certified.

3.5.6 WORKMANSHIP

Where samples or visual aids showing acceptable workmanship are necessary, they shall be selected by the seller subject to review by the buyer or its designated quality representative.

Standards shall be reviewed and revised or replaced, as necessary, to satisfy current requirements. Standards shall contain appropriate product acceptance/rejection criteria.

3.5.7 CONTROL OF TEMPORARY INSTALLATIONS AND REMOVALS

Quality Assurance shall maintain a log or otherwise ensure the management and control of articles or components that are temporarily installed or removed to facilitate manufacturing, testing, shipping, or handling of the Contract End Item . The control shall be initiated upon installation or removal of the first temporarily installed or removed item and shall be maintained through delivery to prevent them from becoming a part of the final configuration.

3.5.8 QUALITY ASSURANCE DESIGNEES

A systematic approach may be developed to designate certain trained and qualified engineers, manufacturing and test personnel to represent Quality Assurance in performing selected inspection and test functions. The approach shall be described in the Quality Plan. The selected inspection and test functions shall exclude those processes, inspections, and tests that are required to verify critical characteristics or where reinspection cannot be readily accomplished due to further assembly or installation of hardware.

3.5.9 INSPECTION PROCEDURES

Where inspection operations are complex and difficult to perform, Quality Assurance shall assure the preparation of specifically planned procedures to assure accuracy and validity of data and supplement the normal fabrication and inspection planning. These procedures shall be controlled and shall be based on current design information.

3.6 TEST CONTROLS

3.6.1 VERIFICATION

Quality Assurance shall verify tests that demonstrate program, contract, drawing, and specification requirements have been met on all articles and materials procured and produced. Quality Assurance approval of test results shall be provided to show that the quality inherent in the design is maintained in the articles produced. Quality Assurance shall review the test or verification plan to ensure inclusion of pertinent quality requirements.

3.6.2 TEST PROCEDURES

Approved test procedures shall be readily available to inspection and test personnel at the applicable location at the time of inspection or test. Quality Assurance shall assure that test procedures include the following information:

3.6.2.1 Nomenclature and identification of the test article or material.

3.6.2.2 Characteristics and design criteria including values and tolerances for acceptance and rejection.

3.6.2.3 Identification of characteristics and design criteria specified for verification.

3.6.2.4 Detailed steps and operations to be taken in sequence including verifications to be made before proceeding.

3.6.2.5 Identification of measuring or NDE equipment to be used specifying range and type.

3.6.2.6 Details or instructions for operation of special data recording equipment.

3.6.2.7 Layout of interconnection of test equipment and articles.

3.6.2.8 Identification of hazardous situations or operations.

3.6.2.9 Precautions to comply with established safety requirements, ensure safety of personnel, and to prevent damage or degradation of articles and measuring equipment.

3.6.2.10 Environments and other conditions to be maintained.

3.6.2.11 Identification of any reference drawings, specifications, workmanship standards, and/or reference documents required to enable full comprehension of test requirements.

3.6.2.12 Constraints on inspection or testing.

3.6.2.13 Special instructions for nonconformances, anomalous occurrences, or results.

3.6.2.14 Details of sampling plans used.

3.6.2.15 Details of NDEs.

3.6.2.16 Identification of steps that involve critical items or requirements.

3.6.2.17 Configuration/revision level of hardware/software used during test.

3.6.3 TEST PERFORMANCE

Quality Assurance shall assure that tests are performed in accordance with approved procedures and that any deviations to the test procedures are properly recorded and approved. Each test operation shall be traceable to the individual responsible for its accomplishment. Articles undergoing test shall not be adjusted, modified, repaired, reworked, or replaced except as authorized by properly approved documents. Quality Assurance test verification shall include the following:

3.6.3.1 Prior to testing, Quality Assurance shall verify that approved test procedures are available, that test equipment is calibrated and properly configured, that the facility is properly configured, that all manufacturing and lower level test operations are complete, and that the configuration of the article is correct and ready for test.

3.6.3.2 During testing, Quality Assurance shall verify that testing is performed in accordance with approved test procedures or that procedure deviations are recorded, that test data are accurately recorded and that all nonconformances are documented.

3.6.3.3 Subsequent to testing, Quality Assurance shall verify that test results and data are complete and traceable to the test articles, that proper dispositions of articles have been made, that nonconformances are documented, that remedial action and recurrence control requirements are initiated and that integrity control of test articles is properly established and implemented.

3.6.3.4 Documentation shall include procedures for the development, verification and control of computer software/firmware used in conjunction with measurement and test equipment for acceptance of articles.

3.6.4 INSPECTION AND TEST RECORDS AND DATA

3.6.4.1 Records. Records and data of all inspections and tests performed shall be prepared and maintained in sufficient detail to verify and evaluate the status of articles and materials.

3.6.4.2 Acceptance Data Package (ADP). ADPs shall be prepared and maintained in accordance with contract data requirements. Quality Assurance shall ensure the ADPs are prepared and maintained.

3.6.4.3 Acceptance Review (AR). Quality Assurance shall participate in ARs to assure compliance with documentation requirements. The following information, items 3.6.4.3.1 through 3.6.4.3.10, shall be provided for review at the AR, additionally item 3.6.4.3.11 shall be readily retrievable at the AR.

3.6.4.3.1 A summary of test and checkout operations and results with anomalies encountered, failure history, remedial actions, and recurrence control.

3.6.4.3.2 The status of any open work, including open items from previous reviews, shortages, nonconformances, unincorporated engineering changes, etc., and constraints on further activities.

3.6.4.3.3 Identification of waivers/deviations and verification of approvals.

3.6.4.3.4 Identification of limited life components and their remaining life.

3.6.4.3.5 A comparison of as–designed versus as–built configuration listings and rationale for any differences from approved baseline designs.

3.6.4.3.6 The test procedure and test data for all end item acceptance tests including strip charts, deviations, and other data applicable to evaluate test records.

3.6.4.3.7 Completed deliverable Acceptance Data Package (ADPs).

3.6.4.3.8 A form DD250 or other contractually authorized documents prepared for signature.

3.6.4.3.9 Records of all open nonconformances occurring during manufacturing and test of the end–item.

3.6.4.3.10 Handling, shipping, storage, preservation, packing, and packaging instructions, including environmental constraints, identification of hazards, and maintenance requirements and user manuals.

3.6.4.3.11 In addition, all supporting documentation, which may be required to establish equipment acceptability, should be readily retrievable. This includes, but is not limited to, engineering drawings, schematics, supplier ADPs, test specifications, closed nonconformances, fabrication and inspection test records, etc.

3.7 NONCONFORMING ARTICLES AND MATERIALS

3.7.1 NONCONFORMANCE CONTROL SYSTEM

Quality Assurance shall establish, implement, and maintain a documented closed–loop system for controlling nonconformances. This system shall include provisions for recording, analysis, remedial action, recurrence control, verification, and feedback of data on articles and materials which do not conform to drawings, specifications, or other requirements. Special emphasis shall be placed on tracking and resolving repetitive nonconformances. The buyer shall assure that subcontractors and suppliers implement a closed–loop system which complies with the requirements of this paragraph.

3.7.2 IDENTIFICATION OF NONCONFORMANCES

Nonconformances shall be documented in accordance with contract data requirements. Nonconformance recording shall commence with initial receipt of materials or articles for NASA procurement and continue through all subsequent phases of the program nonconforming articles or materials shall be identified, segregated to the extent practicable, and held for disposition.

3.7.3 NONCONFORMANCE EVALUATION

Appropriate analysis and examination of nonconforming articles, materials, or conditions shall be conducted to determine the cause or reason for the nonconformance and to recommend further action.

3.7.4 NONCONFORMANCE DISPOSITIONS

The contractor may disposition nonconforming articles or materials without the participation of the buyer or their delegated representatives as follows:

3.7.4.1 Return to Supplier. When, on receipt, an article or material is found to be nonconforming, it should be returned to the supplier. The contractor shall provide the supplier with sufficient nonconformance information to allow correction of the defect and development of corrective action to preclude recurrence.

3.7.4.2 Return for Rework or Completion of Operations. Rework or completion of operations shall be performed using established fabrication, inspection, and test documents.

3.7.4.3 Scrap. If the article or material is unfit for use and is below the approved cost threshold, its disposition shall be assigned in accordance with buyer approved procedures for identifying, controlling, and disposing of scrap.

3.7.4.4 Repair per Standard Repair Procedure (SRP). Repair per SRP is allowed only if the Material Review Board (MRB) has previously approved the SRP.

3.7.4.4.1 Limitations for use shall be specified on each SRP. The existence of standard repair procedures shall not relieve the contractor of the responsibility for initiating preventive action to the fullest extent.

3.7.4.5 Material Review Board. All other nonconformances shall be submitted to the MRB for final disposition.

3.7.4.6 Nonconformance dispositions referred to in paragraphs 3.7.4.1 through 3.7.4.4, shall be subject to review by the designated buyer quality representative.

3.7.5 MATERIAL REVIEW BOARD ACTION

MRB membership and the disposition and control of affected hardware shall be based on the following:

3.7.5.1 The MRB shall be comprised of at least one representative whose primary responsibility is engineering, one representative from the seller’s Quality Assurance organization, and a designated quality representative of the buyer. MRB members may consult with other organizations and personnel, as required, to arrive at optimum decisions.

3.7.5.2 Dispositions of nonconformances by the MRB require unanimous agreement. Decisions shall be based on intended use and criticality of the hardware; record review of earlier actions, materials, and techniques used for repair; and retest requirements necessary to revalidate functional acceptability. The board shall make one of the following dispositions and specify the action in the nonconformance document:

3.7.5.2.1 Repair. Specific repair instructions shall be documented on the nonconformance record and approved by the MRB prior to the repair activity.

3.7.5.2.2 Use As Is. Nonconforming items which the MRB dispositions as suitable for use without repair may be authorized for use as is. The rationale for making a use–as–is disposition shall be documented on the nonconformance report.

3.7.5.2.3 Scrap. If the article or material is unfit for use, its disposition shall be assigned in accordance with buyer approved procedures for identifying, controlling, and disposing of scrap.

3.7.5.2.4 Waivers. When the disposition affects contractually imposed program requirements, buyer approval shall be required. Seller waivers shall be submitted to the buyer's contracting officer for approval. Each waiver request shall include buyer Quality Assurance representative remarks to facilitate proper consideration of the waiver and assure correct category. Each waiver shall be submitted in accordance with contract data requirements.

3.7.5.3 MRB Holding Area. Holding areas shall be established for nonconforming articles and materials pending MRB disposition. Access shall be limited to MRB members or personnel authorized by the MRB. Provisions shall be made to prevent unauthorized removal of hardware.

3.7.5.4 Supplier MRB. The seller may delegate MRB responsibility to a supplier upon determining that the supplier meets the MRB requirements of this document. This delegation shall be approved by the buyer.

3.7.5.5 Recurrence Control. Quality Assurance shall assure the evaluation of all nonconformances to determine the need for determination of cause and action required to preclude recurrence. Evidence of such action shall be documented on each nonconformance report prior to close–out. Recurrence control shall include, but shall not be limited to, correction of technical documents and correction of other articles and materials at all locations. Recurrence control shall not preclude continued processing of the nonconforming article or material during the investigation for identification of cause and corrective action.

3.7.6 PROBLEM REPORTING

A closed–loop system shall be provided for reporting and correcting problems. Detailed requirements for problem reporting, analysis, and resolution shall be in accordance with contract data requirements.

3.8 METROLOGY

Metrology shall be in accordance with MIL–STD–45662, or with the following provisions (3.8.1 through 3.8.5):

3.8.1 METROLOGY CONTROLS

A documented metrology system shall be established and maintained to ensure that measurement standards and equipment provide objective evidence that articles and materials produced or procured are in compliance with specifications, drawings, and program and contractual requirements. All new or repaired measurement standards and equipment shall be inspected and/or tested prior to use. Documentation of this effort shall be maintained and made available for review by the designated buyer quality representative.

3.8.2 CALIBRATION RECORDS

Individual records of measurement standards and equipment calibration shall be maintained. These records shall include, but are not limited to, the following:

3.8.2.1 Identification of standard or equipment to be calibrated.

3.8.2.2 Identification of standard or equipment and calibration procedure used in the calibration process.

3.8.2.3 Calibration intervals.

3.8.2.4 Dates and results of each calibration.

3.8.2.5 Due date of next calibration.

3.8.2.6 Individual(s) performing calibration.

3.8.2.7 Calibration facility.

3.8.2.8 Degree of nonconformance of standards or equipment received for calibration.

3.8.3 MEASUREMENT ACCURACY

Random and systematic errors in any calibration measurement shall not exceed 25 percent of the tolerance of the parameter being measured. The contractors calibration system description may include provisions for deviating from the uncertainty requirements provided the adequacy of the calibration is not degraded. All deviations shall be recorded.

3.8.4 CALIBRATION CONTROLS

3.8.4.1 Facility. Each organization shall have its own facility for calibrating measurement standards and equipment or shall use the services of an outside facility which meets the requirements of this paragraph.

3.8.4.2 Traceability. All measurements standards shall be traceable to standards maintained by the National Institute of Standards and Technology or their values shall be derived from a controlled measurement process utilizing a fundamental constant of nature.

3.8.4.3 Handling, Storage, and Transportation. All measurement standards and equipment shall be handled, stored, and transported in accordance with documented procedures which shall preclude equipment damage or degradation of accuracy.

3.8.4.4 Identification and Labeling. All measurement standards and equipment shall be uniquely identified and labeled, tagged, or coded to indicate calibration status and due date of next calibration.

3.8.4.5 Calibration Intervals. Calibration intervals shall be established, documented, and periodically reviewed. Intervals shall depend upon the use, accuracy, type of standard or equipment, and other conditions affecting the measurement process.

3.8.4.6 Recall System. All standards and equipment used in measurement processes shall be recalled and recalibrated at established intervals. Standards and equipment not recalibrated on or before the recall due date or damaged in use shall be removed from service or otherwise restricted from use. Authorization for exception shall be obtained for the buyer.

3.8.4.7 Environmental Requirements. Environmental conditions (i.e. temperature, humidity, vibration, cleanliness) shall be compatible with the requirements of the article and material and calibration measurement process.

3.8.5 REMEDIAL ACTION AND RECURRENCE CONTROL

Recurrence control shall be taken relative to nonconforming measurement standards or equipment. The calibration authority shall notify program using team(s) to the extent of nonconforming measurements. The responsible using team(s) shall perform a risk assessment for articles or materials previously measured using such equipment.

3.9 STAMP CONTROLS

Quality Assurance shall establish and maintain documented stamp and marking material control systems with procedures that provide for the following:

3.9.1 STAMP AND MARKING MATERIALS

Stamps, decals, seals, torque wax, paints, signatures, and other marking devices or materials shall be used, as appropriate, to identify that articles and materials have undergone source and receiving inspection; in–process fabrication and inspection; end–item fabrication and inspection; and end–item testing, storage, and shipment.

3.9.2 STAMP TRACEABILITY

Stamps shall be traceable to individuals responsible for their use, and records shall be maintained to identify individuals with specific stamps. Unissued stamps shall be kept secure to prevent unauthorized use. Stamps issued to personnel being transferred or terminated shall be returned and shall not be reissued for a period of at least six months. Worn or damaged stamps shall be destroyed at the time replacements are issued. The identification symbols (e.g., numbers and letters) of lost stamps shall be withdrawn from use. The use of any stamp by an individual other than the holder of record is specifically prohibited. Periodic checks shall be made to assure that stamps are in possession of the individual to whom they are issued and that they are not worn or damaged.

3.9.3 STAMP APPLICATION

Stamps shall be applied to records to indicate the fabrication or inspection status of associated articles and materials.

3.9.4 ELECTRONIC DATA CONTROL

Verification/validation/acceptance requirements for computerized data entry and retrieval systems and computer generated drawings and documents shall address alternatives to stamp use for certification.

3.9.5 STAMPING/MARKING APPLICATION

Stamps shall be applied to tags, cards, or labels or attached to individual articles and materials or their containers as appropriate.

3.9.6 STATUS STAMPING

Stamps indicating that fabrication, inspection, or test operations have been performed may be applied directly to articles and materials.

3.9.7 STAMPING METHODS

Stamping methods and marking materials must be compatible with the articles and their use.

3.9.8 STAMP SIGNIFICANCE

An up–to–date description and explanation of the significance of all stamps shall be maintained.

3.9.9 CONTRACTOR STAMP DESIGNS

The design of contractors stamps shall be such that fabrication and inspection stamps are distinctly different. Contractor stamps shall not exhibit the designation NASA, abbreviations of any NASA installation, or the designation or abbreviations of the International Partners government without NASA consent.

3.10 HANDLING, STORAGE, PRESERVATION, MARKING, LABELING, PACKAGING, PACKING, AND SHIPPING

3.10.1 PROCEDURES AND INSTRUCTIONS CONTROL

Quality Assurance shall review and approve, prior to their release, all technical documents pertaining to handling, storage, preservation, marking, labeling, packaging, and shipping operations.

3.10.2 HANDLING, HOISTING OR LIFTING

3.10.2.1 Handling equipment used to handle Program Critical Hardware (as defined in the Program Critical Hardware List) shall be prominently marked to indicate the maximum load capacity. Handling equipment used for handling non–Program Critical Hardware does not require maximum load capacity marking.

3.10.2.2 Hoisting, or lifting equipment (e.g. slings) shall be prominently marked to indicate the maximum load capacity and the due date of the next rated or periodic load test. Quality Assurance personnel will verify that the required test and maintenance are accomplished within the specified frequency.

3.10.3 STORAGE

Storage areas for articles and materials shall be controlled. The controls shall include the following:

3.10.3.1 Controlled acceptance into and withdrawal from the storage area.

3.10.3.2 Positive identification of limited–life material and removal of materials with expired shelf life.

3.10.3.3 Periodic inspection of stored material, housekeeping, and record keeping.

3.10.3.4 Systematic inspection and/or testing necessary to ensure maintenance of preservation including special environments.

3.10.4 PRESERVATION

Quality Assurance shall verify that articles and materials subject to deterioration, corrosion, or contamination are preserved by documented methods.

3.10.5 PACKAGING AND PACKING

3.10.5.1 Quality Assurance shall verify that packaging and packing material, procedures, and instructions are used.

3.10.5.2 Special attention shall be directed toward critical, sensitive, dangerous, and high–value articles. Reusable containers shall be inspected prior to each use.

3.10.6 MARKING AND LABELING

Quality Assurance shall verify that marking and labeling for packaging, storage, and shipping of articles and materials are performed in accordance with applicable specifications. Special attention shall be given to critical, sensitive, dangerous, and high–value articles.

3.10.7 SHIPPING

3.10.7.1 Control. Quality Assurance shall verify the following:

3.10.7.1.1 Articles and materials have been prepared and packaged in accordance with applicable procedures and requirements and have been properly identified and marked. In the absence of special packing and marking requirements, packing and marking shall comply with Interstate Commerce Commission rules and regulations.

3.10.7.1.2 Accompanying documents have been properly identified as to inspection status by appropriate inspection stamps and the data package is complete.

3.10.7.2 Unscheduled Removal. The contractor shall notify the designated procuring agency or organization quality representative in the event of any unscheduled removal of an article or material from its container. The extent of reinspection and retest shall be authorized by procuring agency or organization quality representative.

3.11 SAMPLING PLANS, STATISTICAL PLANNING, AND ANALYSIS

3.11.1 SAMPLING PLANS

Sampling plans may be used when inspection test are destructive or when data, inherent characteristics, or the noncritical application of an article or material indicates that a reduction in inspection or testing will not jeopardize quality, reliability, or design intent. When sampling techniques are to be employed, MIL–STD–105, Sampling Procedures and Tables for Inspection by Attributes, or MIL–STD–414, Sampling Procedures and Tables for Inspection by Variables for Percent Defective, whichever is appropriate, shall be used. Sampling plans, other than those contained in MIL–STD–105 and MIL–STD–414, may be used after approval by the designated buyer quality representative.

3.11.2 STATISTICAL ANALYSIS

Statistical analysis techniques may be used where such use will provide effective control over fabrication and inspection operations especially in those areas where special processes and equipment are difficult to control.

3.12 CONTROL OF NASA AND INTERNATIONAL PARTNER PROPERTY

3.12.1 CONTRACTOR RESPONSIBILITY

Contractor Quality Assurance shall ensure that a documented system for controlling NASA and International Partner property and associated documentation has been established and is maintained as follows:

3.12.1.1 Upon receipt, contractor Quality Assurance shall inspect NASA and International Partner property to detect damage in transit and to verify that the article and its ADP are complete and as specified in the shipping documents. Articles found to be serviceable shall be represerved and repackaged unless the articles are to be used immediately. Should there be evidence of damage in transit, the article shall be inspected to determine the extent of damage and a report of the damage provided to the designated NASA or International Partner representative. Receiving inspection results shall be recorded in the historical record for the article.

3.12.1.2 When functional testing is performed on NASA and International Partner property during receiving inspection or prior to installation into the next level of assembly, the designated NASA or International Partner representative shall be notified and may participate in the testing activity.

3.12.1.3 Documented procedures shall describe the control of approved storage areas for NASA or International Partner property. Controls shall include the following:

– Limited personnel access

– Controlled receipt and withdrawal

– Identification of article status

– Inventory list of articles in the area

– Scheduled inspection of the area and periodic verification of the inventory list

– Controls for items that must be environmentally protected

3.12.1.4 The contractor shall provide for the protection, maintenance, calibration, periodic inspection, segregation, and controls necessary to ensure that quality of NASA and International Partner property is maintained and that damage and deterioration do not occur during handling, storage, installation, or shipment.

3.12.1.5 NASA and International Partner property shall not be diverted or loaned from its assigned purpose without the prior approval of the designated NASA or International Partner representative.

3.12.2 UNSUITABLE NASA OR INTERNATIONAL PARTNER PROPERTY

NASA and International Partner property found to be damaged or otherwise unsuitable for its intended use shall be identified as nonconforming, segregated to the extent practicable, held for

review, and analyzed to ascertain the probable cause of damage. When cause is determined to be in the contractors operations or activities, action shall be taken to prevent recurrence. Disposition shall not be assigned to discrepant NASA and International Partner property nor shall this property be reworked, repaired, modified, or replaced without the specific written authorization of NASA or the appropriate International Partner. NOTE: Paragraph 3.7.6 may apply.

4.0 SOFTWARE QUALITY ASSURANCE

Software Quality Assurance shall be in accordance with DOD–STD–2168, and the following additions:

4.1 OPERATIONS AND MAINTENANCE

SQA shall assure that a process is established for the planning and evaluation of software operation and sustaining engineering activities. The process shall ensure the retention of quality attributes and that changes will not adversely affect the required system failure tolerance.

4.2 DEVIATIONS AND WAIVERS

SQA shall evaluate deviation and waiver requests to ISS baselined software requirements for potential impacts affecting quality, and recommend dispositions for management concurrence.

4.3 FAILURE REPORTING AND RECURRENCE CONTROL (FRRC)

Detailed requirements for problem reporting, analysis, and resolution shall be in accordance with SSP 30223. SQA shall ensure that problems that meet the criteria of SSP 30223 are entered in the SS PRACA Data System (PDS) for assessment, tracking, corrective action, and closure. SQA shall ensure that procedures are in place to evaluate the impact of a reported problem, the resources required for corrective action, and the impact of not taking corrective action. The procedures shall include requirements for retesting the software and a process for incorporating the correction in new versions of the software.

4.4 SECURITY AND PRIVACY ASSURANCE

SQA shall ensure that system security and privacy requirements for the SS have been implemented in accordance with JSCM 2410.11.

APPENDIX A ACRONYM LIST

ADP	Acceptance Date Package
AR	Acceptance Review
CAGE	Contractor and Government Entity
DR	Data Requirements
EEE	Electrical, Electronic, and Electromechanical
ESD	Electrostatic Discharge
FMECA	Failure Modes, Effects and Criticality Analysis
FSE	Flight Support Equipment
GSE	Ground Support Equipment
GSI	Government Source Inspection
ISS	International Space Station
MIP	Mandatory Inspection Point
MRB	Material Review Board
NASA	National Aeronautics and Space Administration
NDE	Nondestructive Evaluation
OSE	Orbital Support Equipment
PCA	Physical Configuration Audit
PDS	PRACA Data System
PRACA	Problem Reporting and Corrective Action
QA	Quality Assurance
QAR	Quality Assurance Representative
SQA	Software Quality Assurance
SRP	Standard Repair Procedure
SS	Space Station

APPENDIX B GLOSSARY

Acceptance

The act of an authorized agent of the buyer by which the buyer assents to ownership of existing and identified contract items or approves specific services rendered as partial or complete performance of a contract.

Calibration

Comparison of two instruments or measuring devices, one of which is a standard of known accuracy traceable to national standards, to detect, correlate, report, or eliminate by adjustment any discrepancy in accuracy of the instrument or measuring device being compared with the standard.

Certification

The formal written act whereby a responsible official attests to the satisfactory accomplishment of specified activities and authorizes the specified hardware/software, procedures, facilities, and/or personnel for program usage.

Characteristic

A physical, chemical, visual, functional, or any other identifiable property of a product of material.

Corrective Action

Action taken to preclude occurrence on an identified hazard or to prevent recurrence of or resolve a problem.

Critical Characteristics

Any physical attribute of an article or material which if defective can cause loss of life or equipment, or make the article or material nonfunctional.

Defect

Any nonconformance of a characteristic with specified requirements.

Deviation

Specific authorization, granted before the fact, to depart from a particular elements requirement, specification, or related document. See Waiver.

Inspect

Independent, hands on inspection.

Inspection

A method of verification of physical characteristics that determines compliance without the use of special equipment, procedures, test support items, or services. Inspection uses standard methods such as visuals, gauges, etc., to verify compliance with requirements.

Lot

Articles produced in a given time sequence with no change in materials, tooling, processes, personnel, techniques, or configuration.

Material Review Board

The formal Contractor–Government Board established for the purpose of reviewing, evaluating, and disposing of specific nonconforming supplies or services; and, for assuring the initiation and accomplishment of corrective action.

Monitor

Less than 100% witnessing or inspection.

Nonconformance

A condition of any article or material or service in which one or more characteristics do not conform to specified requirements. Includes failures, discrepancies, defects, and malfunctions.

Part

One or more pieces joined together which are not normally subject to disassembly without destruction.

Pre–Award Survey

An evaluation of a prospective contractor's capability to perform under the terms of a proposed contract.

Problem

Any nonconformance which or which is suspected of fitting one of the following categories:

— Failure or unsatisfactory condition occurring, during or subsequent to production acceptance testing.

— Failure or unsatisfactory condition which occurs prior to acceptance testing that will affect or has the potential of adversely affecting safety, will contribute to schedule impact or launch delay, or will result in the need for design change, or indicates a generic EEE parts concern (trend).

Problem Reporting and Corrective Action (PRACA)

A controlled technique for identifying, reporting, analyzing, explaining, and preventing recurrence of problems.

Procurement Documents

Such documents as purchase orders, subcontracts, statements of work, technical specifications, and intercorporate work orders required to define articles, materials, and services being procured and the terms and conditions imposed.

Quality

The composite of all the attributes or characteristics, including performance of an item or product.

Quality Assurance

A planned and systematic pattern of all actions necessary to provide adequate confidence that the item or product comforms to established technical requirements.

Quality Assurance Representative (QAR)

The individual directly charged with performance of the Government procurement quality assurance function at a contractor facility.

Recurrence Control

Action taken to prevent repetition of a nonconformance.

Remedial Action

Action to correct a nonconformance.

Repair

Operations performed on a nonconforming article or material to place it in a usable and acceptable condition; requires additional written procedures and additional operations.

Rework

The continuation of processing of articles and materials that will make them conform to drawings, specifications, procedures, or contract. Requires only normal operations to complete the article or material in accordance with the applicable documents and does not require additional written procedures.

Sample

One or more units of product drawn from a lot or batch, the units of the sample being selected at random without regard to their quality.

Verify

Review of recorded data (inspection, test, etc.) for conformance to specifications, drawing requirements, etc.

Verification

A process which determines that the SS hardware and software systems meet all design, performance, and safety requirements. The verification process includes analysis, test, inspection, demonstration, or a combination thereof.

Waiver

A written authorization, granted after the fact, for use or acceptance of an article which does not meet specified requirements. See Deviation.

Witness

To observe a test or process to verify that correct procedures and processes are followed for a specific action.